

REPORT DOCUMENTATION PAGE

Form Approved
OMB NO. 0704-0188

Public Reporting burden for this collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comment regarding this burden estimates or any other aspect of this collection of information, including suggestions for reducing this burden, to Washington Headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington, VA 22202-4302, and to the Office of Management and Budget, Paperwork Reduction Project (0704-0188), Washington, DC 20503.

1. AGENCY USE ONLY (Leave Blank)		2. REPORT DATE 02/26/2002	3. REPORT TYPE AND DATES COVERED Final - 05/01/2000 - 02/26/2002
4. TITLE AND SUBTITLE Antenna-Coupled Uncooled Infrared Focal Plane Arrays: In-house Fabrication.		5. FUNDING NUMBERS N00014-00-1-0712	
6. AUTHOR(S) Dr. Glenn Boreman			
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) School of Optics/CREOL / University of Central Florida P.O. Box 162700 Orlando, FL 32816-2700		8. PERFORMING ORGANIZATION REPORT NUMBER	
9. SPONSORING / MONITORING AGENCY NAME(S) AND ADDRESS(ES) Office of Naval Research - Regional Office Atlanta 100 Alabama Street NW, Suite 4R15 Atlanta, GA 30303-3104		10. SPONSORING / MONITORING AGENCY REPORT NUMBER	
11. SUPPLEMENTARY NOTES The views, opinions and/or findings contained in this report are those of the author(s) and should not be construed as an official Department of the Army position, policy or decision, unless so designated by other documentation.			
12 a. DISTRIBUTION / AVAILABILITY STATEMENT Approved for public release.		12 b. DISTRIBUTION CODE	
13. ABSTRACT (Maximum 200 words) Under the support of the subject DURIP grant, University of Central Florida CREOL has developed an in-house capability for direct-write electron-beam fabrication of the microantenna coupled infrared sensors being investigated for contract to BMDO. The facility developed has resulted in shorter turn-around times for exploration of new device designs while giving a greater degree of process control. Establishment of this facility at CREOL has provided a cost-effective means for prototype device development for infrared focal-plane array applications.			
14. SUBJECT TERMS infrared focal plane arrays		15. NUMBER OF PAGES 3	
		16. PRICE CODE	
17. SECURITY CLASSIFICATION OR REPORT UU	18. SECURITY CLASSIFICATION ON THIS PAGE UU	19. SECURITY CLASSIFICATION OF ABSTRACT UU	20. LIMITATION OF ABSTRACT UU

NSN 7540-01-280-5500

Standard Form 298 (Rev.2-89)
Prescribed by ANSI Std. Z39-18
298-102

20020308 092

Final report on DURIP Grant

Antenna-Coupled Uncooled Infrared Focal Plane Arrays: In-house Fabrication

Glenn Boreman
CREOL/School of Optics
University of Central Florida
Orlando, FL 32816
407 823 6815 (t)
407 823 6880 (f)
boreman@creol.ucf.edu

Abstract:

Under the support of the subject DURIP grant, University of Central Florida CREOL has developed an in-house capability for direct-write electron-beam fabrication of the microantenna coupled infrared sensors being investigated for contract to BMDO. The facility developed has resulted in shorter turn-around times for exploration of new device designs while giving a greater degree of process control. Establishment of this facility at CREOL has provided a cost-effective means for prototype device development for infrared focal-plane array applications.

The main goal of the DURIP program “Antenna-Coupled Uncooled Infrared Focal Plane Arrays: In-house Fabrication” was to develop a fabrication facility for direct-write electron-beam lithography. The objectives of the lithographic fabrication are antenna-coupled IR sensors of the type shown in Fig. 1, for which the required on-chip resolution is around $0.1\text{ }\mu\text{m}$.

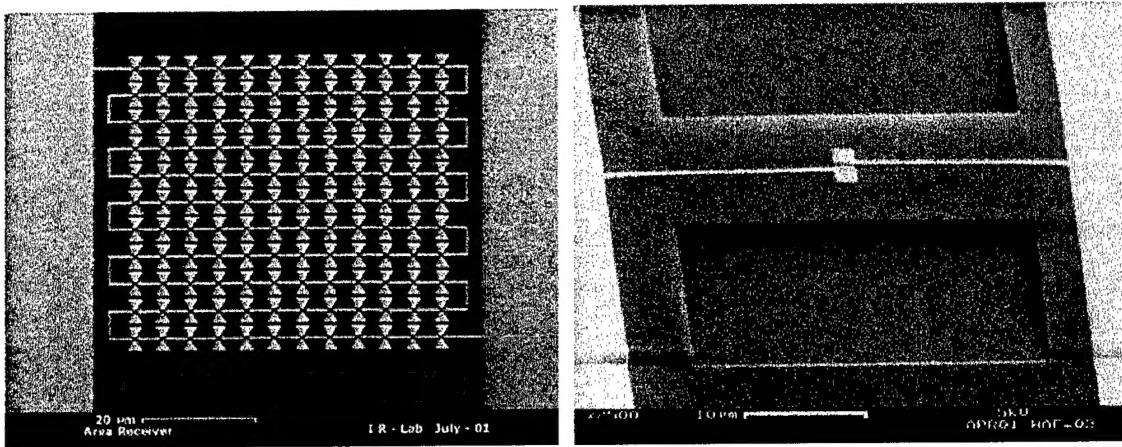


Figure 1. Antenna-coupled IR sensor array; antenna-coupled IR sensor on air bridge.

To this end, we purchased and installed the following major equipment in a purpose-built 400-square-foot class-10,000 cleanroom located in the PI's laboratory (Infrared Systems Laboratory) at CREOL.

- JEOL JSM-5900 Scanning Electron Microscope
- Raith ELPHY beam-control system for direct-write lithography
- Materials Research Corp. MRC8667 Sputter Deposition System
 - Includes both DC/RF sputtering tools
 - Current material capabilities include Au, Al, Ni, NiO, VO_x , Ti, Si, SiO_2
- Pure Aire Laminar Flow System
- Headway Research Corp. Resist Spinner

Through other funding sources, including University Matching Grants and externally funded contracts, we were able to complement the above items with other fabrication tools and equipment. Figure 2 shows photos of the completed facility with all equipment installed.

- Branson P2000 plasma etching system
- Structure Probe critical point dryer
- Wafer probe station
- HP 4145 semiconductor parameter analyzer
- Karl Suss wafer scribe
- West Bond wire bonding station
- Olympus inspection microscope

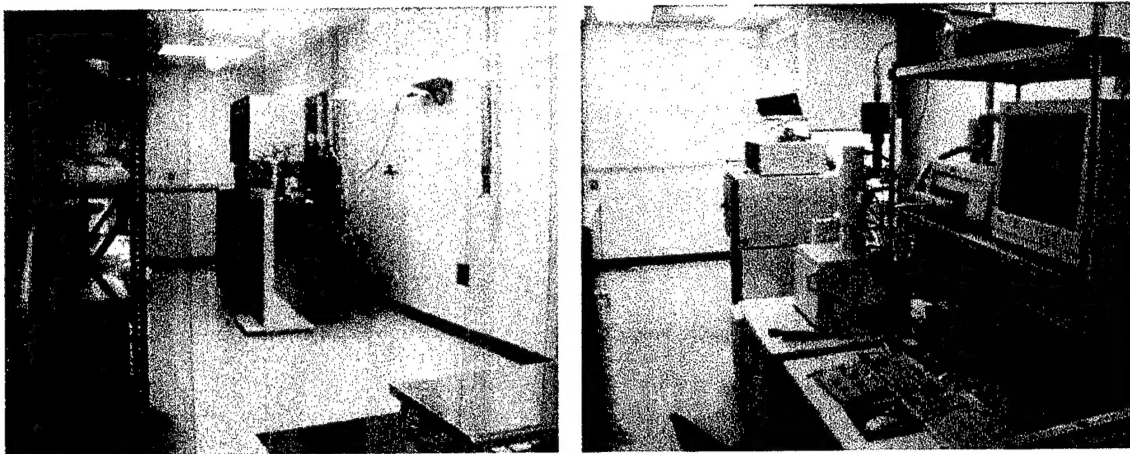


Figure 2. Anteroom with gowning area and sputtering system; inner chamber with e-beam lithography system, resist processing station, and plasma etching system.

UCF/CREOL graduate students who presently use this facility for their thesis research:

- Michael Gritz, PhD Student in EE
E-beam fab, specialized etch chemistry, antenna design.
- Javier Gonzalez, PhD Student in EE
E-beam fab, low-noise electronics, antenna design.
- Mo Rahman, PhD Student in EE
Low-noise electronics, RF techniques.
- Brian Monacelli, PhD Student in Optics
Optical testing and sensor evaluation.